

## ABSTRACT OF THE DISCLOSURE

The present invention discloses eleven reduced dimensionality (RD) triple resonance nuclear magnetic resonance (NMR) experiments for measuring chemical shift values of certain nuclei in a protein molecule, where the chemical shift values encoded in a peak pair of an NMR spectrum are detected in a phase sensitive manner. The RD 3D  $\underline{\text{H}}\underline{\text{A}},\underline{\text{C}}\underline{\text{A}},(\text{CO}),\text{N},\text{HN}$  NMR and RD 3D  $\underline{\text{H}},\underline{\text{C}},(\text{C-TOCSY-CO}),\text{N},\text{HN}$  NMR experiments are designed to yield “sequential” connectivities, while the RD 3D  $\underline{\text{H}}^{\alpha/\beta},\underline{\text{C}}^{\alpha/\beta},\text{CO},\text{HA}$  NMR and RD 3D  $\underline{\text{H}}^{\alpha/\beta},\underline{\text{C}}^{\alpha/\beta},\text{N},\text{HN}$  NMR experiments provide “intraresidue” connectivities. The RD 3D  $\underline{\text{H}},\underline{\text{C}},\text{C},\text{H-COSY}$  NMR, RD 3D  $\underline{\text{H}},\underline{\text{C}},\text{C},\text{H-TOCSY}$  NMR, and RD 2D  $\underline{\text{H}},\underline{\text{C}},\text{H-COSY}$  NMR experiments allow one to obtain assignments for aliphatic and aromatic side chain chemical shifts, while the RD 2D  $\underline{\text{H}}\underline{\text{B}},\underline{\text{C}}\underline{\text{B}},(\text{CG},\text{CD}),\text{HD}$  NMR experiment provide information for the aromatic side chain chemical shifts. In addition, methods of conducting suites of RD triple resonance NMR experiments for high-throughput resonance assignment of proteins and determination of secondary structure elements are disclosed.